303.04.06 Relaid Existing Pipe Culverts-Any Size will be measured and paid for as specified in 303.04.01 unless otherwise specified in the Contract Documents.

303.04.07 New end walls, end sections, etc., will be measured and paid for as specified in Section 305.

303.04.08 Removal of existing headwalls, end sections, etc., that are not incidental to the Contract price for the respective pipe items will be measured and paid for as specified in Section 207.

303.04.09 Encasement concrete, and concrete or brick masonry to plug existing pipes will be measured and paid for at the Contract price for the pertinent Concrete Mix No. 2 for Miscellaneous Structures, or Brick Masonry for Miscellaneous Structures item.

303.04.10 Clean Existing Pipe Any Size will be measured and paid for at the Contract unit price per linear foot.

SECTION 304 — STRUCTURAL PLATE PIPE AND STRUCTURAL PLATE PIPE ARCH CULVERTS

304.01 DESCRIPTION. This work shall consist of furnishing and installing structural plate pipe and structural plate pipe arch culverts that are composed of curved plates bolted together in the field as specified in the Contract Documents or as directed by the Engineer.

304.02 MATERIALS.

Selected Backfill	302.02
Concrete Mix No. 2	902.10
Structural Plate for Pipe and Pipe Arches	905

304.03 CONSTRUCTION.

304.03.01 Fabrication. The plates, including required holes, shall be shop fabricated to the required dimensions. The plates shall be shipped complete with proper markings and include all necessary connection devices such as bolts, nuts and washers. The Contractor shall provide working drawings, including erection diagrams and strutting tables acceptable to the Engineer. Erection diagrams shall include proposed lengths and lifting locations of preassembled sections. Fabrication shall not be performed until working drawings are approved by the Engineer.

The plate configurations shall have radii and curvature conforming to AASHTO Standard Specifications for Highway Bridges. When bottom plates are specified to be thicker than top and side plates, the thicker plates for circular pipes shall cover at least 25 percent of the periphery of the circle. For pipe arches, the thicker plates shall include corner plates as well as bottom plates. These culverts shall be laid on a firm bed true to line and grade as specified in the Contract Documents.

Bolt holes along those edges of the plates that will form longitudinal seams in the finished structure shall be staggered in rows 2 in. apart, with one row in the valley and one in the crest of the corrugations unless otherwise specified in the Contract Documents. Bolt holes along those edges of the plates that will form circumferential seams in the finished structure shall provide for a bolt spacing of not more than 12 in. The diameter of the bolt holes in the longitudinal seams shall not exceed the diameter of the bolt by more than 1/8 in.

Edges shall be shop cut to line and grade and shall be free from oxide and burrs. Connections shall be staggered so that no more than three plates come together at any one point. Plates shall be formed to provide lap joints.

304.03.02 Excavation. When a structural plate pipe or structural plate pipe arch is to be laid on existing ground, on or under fill, embankment shall be constructed to a height of at least 18 in., but not more than 3 ft above the proposed top of the pipe. The trench shall then be excavated to receive the pipe. The width of trench shall be sufficient to permit thorough tamping of the backfill under the haunches and around the pipe. This width shall be twice the outside diameter of the pipe or the outside diameter plus 18 in. on each side, whichever is less. Refer to 402.03.01 for excavated material.

304.03.03 Foundation Preparation. Bedding shall conform to 303.03.02. Rails shall be set and the foundation screeded to be coincidental with the exact shape of the bottom plates, and the screeding shall be done immediately prior to erection.

304.03.04 Erection. When strutting is required, it shall be uniform from end to end. Struts shall be left in place until backfills are completed. Nuts and bolts shall be tightened between 100 and 200 ft·lb of torque.

When washers are specified, they shall be placed under the turned element. Bolts shall first be distributed over the section being assembled and holes made to align by shifting the plates. For bottom plates, the nuts shall be inside the structure. Nuts shall not be drawn tight until the section is assembled. Before backfilling, all nuts shall be finally tightened and tested to ensure compliance with torque requirements.

304.03.05 Backfill. Earth for backfill shall be free from large lumps, clods, and rocks and shall be placed along the side of the pipe for the full width of the trench in layers not exceeding 6 in. uncompacted depth. Compaction shall conform to Section 210. Each layer shall be compacted on both sides of the pipe by means of an approved mechanical tamper. Special care shall be taken to compact the fill thoroughly under the haunches of the pipe.

The backfill shall be elevated uniformly along each side of the structure to a height of not less than 18 in. above the top of the structure. For structures without headwalls, backfill shall start in the center of the structure. If the structure includes headwalls or spandrel walls, backfilling operations shall start at one wall and extend toward the opposite side. When batteries or multicell installations are specified, backfill between cells shall be elevated equally on each side of each cell.

No trucks or construction equipment shall be allowed to pass over any part of a structural plate pipe structure until the backfill has been completed and tamped up to a height of not less than 18 in. above the structure.

304.03.06 Concrete Invert. When specified in the Contract Documents, the invert of structural plate pipe or structural plate pipe arch culverts shall be paved using Concrete Mix No. 2. The concrete shall be placed and cured as specified in Section 420.

304.03.07 End Treatment. Ends of structural plate pipes and structural plate pipe arches shall be shop fabricated on a bevel to fit and be flush with the slope and alignment of the surface through which they protrude, except that where an end wall or masonry slope protection is specified, the ends of the structural plates shall then be shop fabricated to fit that construction. The ends of all structural plate pipes and structural plate pipe arches that require an end treatment (end wall or slope protection) shall contain hook bolts for anchorage into the concrete.

Headwalls for structural plate pipes and pipe arches shall conform to Section 305 and unless otherwise specified, shall be constructed parallel to the proposed outer edge of the roadway shoulder.

304.04 MEASUREMENT AND PAYMENT. The payment for the items specified in the Contract Documents will be full compensation for all applicable fabrication, assembly, excavation, sheeting, shoring, strutting, dewatering, hauling, invert paving, storing, rehandling of material, removal and disposal of excess and unsuitable material, tamped fill, foundation preparation, backfill, compaction and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

304.04.01 Structural Plate Pipe and Structural Plate Pipe Arch Culverts will be measured and paid for at the Contract unit price per linear foot. Measurement will be as follows: measure the top length and the bottom length and average. The average length will be the pay length for each pipe in the structure. For multiple pipes, the length will be totaled to obtain the total pay length.

304.04.02 Excavation required below the planned elevation will be measured and paid for as specified in 301.04.

304.04.03 Selected backfill will be measured and paid for as specified in Section 302.

304.04.04 Headwalls will be measured and paid for as specified in Section 305.

SECTION 305 — MISCELLANEOUS STRUCTURES

305.01 DESCRIPTION. This work shall consist of constructing miscellaneous cast-in-place concrete or masonry structures, installing precast concrete or polyethylene (PE) structures, and cleaning existing inlets as specified in the Contract Documents or as directed by the Engineer.

305.02 MATERIALS.

Mortar Sand	901.01
Curing Materials	902.07
Concrete Mix No. 2, No. 3 or No. 6	902.10
Grout	902.11
Brick	903.02
PVC and PE Pipe	905
Reinforcement Steel	908
Steel	909.02
Castings for Frames, Covers, Gratings and Steps	909.04
Polyethylene (PE) Manholes	921.10
Zinc Coating	A 153
Stone	M 43 Size No. 57
Precast Concrete End walls, Inlets, and Manholes	M 199